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THE RAT MITE ATTACKING MAN.

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The blood-sucking mite of the rat, *Liponyssus bacoti* Hirst, has recently attracted attention in the South as an annoyer of man. So far as the writer is aware there are no published references to the occurrence of this pest in the United States, although its habit of attacking man has been reported by Hirst.¹ The species is known to occur in New South Wales and Western Australia, Egypt, Abyssinia, and Argentina.

The first occurrence of these mites in the United States to be reported to the writer was during the spring of 1920, when a department store in Dallas, Tex., called for aid. Early in 1921, reports of similar trouble began coming in from various establishments in Dallas and Fort Worth, Tex. The trouble in some instances was acute, causing the expenditure of much time and money in efforts to combat it and, in certain cases, compelling the abandonment of parts of buildings, as in the case of the dead letter division of the post office in the basement of the Federal building in Fort Worth.

Dr. A. H. Flickwir, health officer of Houston, Tex., has reported the occurrence of a mite attacking man in a building in that city. Although the species was not determined, it is almost certainly *Liponyssus bacoti*.

A similar occurrence of these mites has been reported by D. L. Van Dine. In this instance the trouble, which occurred in a railway station in a small town in Mississippi, was traced by Mr. Van Dine to the presence of many rats.

OBSERVATIONS ON THE SITUATION IN TEXAS.

The initial outbreak of this mite as a pest to man was coincident with a tremendous increase in the number of rats in the city of Dallas. These rodents began to appear in unusual numbers in 1920 and seemed to reach their maximum abundance in the early summer of 1921. Buildings which were newly constructed of steel and concrete were overrun, and residences in which a rat had never been seen before were frequently invaded.

¹ Hirst, S. 1914. Bul. Ent. Research, London. Vol. 5, part 3, pp. 225-229, December.

As in the case of the infestation of buildings by rats, the mites were to be found in both modern concrete and old frame and brick structures.

The mite troubles seem to have been confined to buildings in the business sections of the city rather than to residences. Only one report of the mite in a residence reached the writer, and this building was not far from the business section. It is possible that the mite may have been introduced into the business section and that it has failed to become generally distributed over the city, or that the dwellings have afforded less opportunity for the uninterrupted breeding of rats. Examination of a number of rats, including their young and nests, in one residential section failed to show the presence of this mite. In the main business portion of the city the distribution was found to be extensive, reports being received throughout almost its entire length. One building devoted to business in a residential section was reported infested. This was located $2\frac{1}{2}$ miles from the nearest known infestation in the main business district.

As to the character and size of the buildings known to be infested, it has been mentioned already that there was considerable trouble from the mite in buildings of thoroughly modern construction. This should not be construed as meaning that there is not a distinct advantage in this type of construction, for it makes possible the control of both rats and mites, whereas in old structures with considerable lumber in their make-up, thorough control is almost an impossibility without extensive overhauling and improvements.

A number of the reports of mite trouble came from department stores. The pests occurred in various departments and often were well distributed among the clothing, hosiery, bolt goods, etc. Some reports came from grocery stores, one from a railroad general-office building, one from a motion-picture theater, and one of the most troublesome infestations was in a music house located in an old structure adjacent to two restaurants where rats were known to abound. The Federal buildings in both Dallas and Fort Worth were infested.

The mites gave trouble on all floors of the buildings, from the lowest to the highest; one of the buildings investigated was 10 stories high, and the mites were present on the top floor.

It appears that the existence of suitable hiding and nesting places for the rats is a greater contributing factor in mite annoyance than the temporary presence of many rats while feeding.

LIFE AND HABITS.

Little definite information has been gained concerning the habits and life history of the mite. All of the infestations investigated by the writer show the mites to have been associated with the brown rat (*Rattus norvegicus*). Mr. Hirst records it from *R. norvegicus*, *R. rattus*, and *Acomys cohirinus*. Judging by the freedom with which it attacks man, there seems little doubt that it would feed on various species of rats and mice as well as other warm-blooded animals.

The comparatively few mites found on the bodies of rats when running about away from their burrows indicates that the mites feed largely on the young or adult rats while they are quiet in their nests

and hiding places and that they detach themselves and remain in such situations. When hungry, however, the mites crawl about freely during day and night in search of food. It was thought at first that the scattering of the hungry mites might be due to the destruction of their normal hosts, the rats, but later observations did not substantiate this, as mites were found in great numbers where the rats were abundant and had not been disturbed. It is possible that there might be associated with this a scarcity of young in the nests or a movement of the rats to other nesting quarters, thus driving the mites to seek food.

From observations in infested premises and a few cage experiments it appears that the mites are not very long lived in any stage when no food is available. In confinement, apart from a host, the greatest longevity noted was 10 days, but it seems to be greater when the mites are allowed to remain in their natural environment in a building.

In many instances mites have been observed to drop from the infested ceiling of a room. They have been found also to pass from one floor of a building to another along pipes extending through the floor.

CHARACTER OF ATTACK ON MAN.

Both the nymphs and adults attack man freely. The pale unfed nymphs usually appear in greatest numbers and are thought by some to bite much more frequently than the adults. All crawl rather actively and frequently do much running about over the body, biting here and there. Some annoy by crawling about without biting, especially on the hands and arms.

No particular region of the body is chosen by the mites to the exclusion of others, although they seem to prefer tender skin. The upper arms and legs apparently suffer most, but bites occur on all parts of the body. There is some tendency to bite where there is some constriction of the clothing, as around the belt.

The bite is distinctly painful at the time the mouth parts are inserted. A sharp itching pain is usually experienced. The duration of the pain from the bite varies with the individual. There is also much variation among individuals as regards frequency of bites, their after effects, and the general annoyance produced by the presence of mites. Some claim to have been made ill through the attack of many mites, and to have had some fever and a feeling of general discomfort. This is probably due to the nervous condition of the victim and revulsion of feeling toward the pest.

Usually there is more or less irritation and itching at the site of attack for several hours along with the development of a small hæmorrhagic area. These red spots seldom persist more than two days.

No specific disease has been connected with these parasites.

SUGGESTIONS FOR CONTROL.

The repression of this mite appears to be essentially a problem in rat control.² Our experience in Texas indicates that where rats are

²For full information regarding the control of rats the reader is referred to Farmers' Bulletin 1302, *How to Get Rid of Rats*, which may be obtained free on application to the Department of Agriculture.

driven out the mite trouble soon subsides. As is well known, complete control of rats is extremely difficult. This is especially true where only sporadic and individual efforts are put forth against them. In the case of the infestations in north Texas a continuous and energetic warfare against the rats has been recommended, and along with this the cleaning out of all débris and nests and thorough spraying with kerosene. On floors a mixture of anthracene oil, 1 part, and kerosene, 2 parts, has been advised and used with success. This apparently destroys and repels the mites for several days. For the spraying of cabinets, desks, and shelves, a fine mist spray of gasoline appears to give temporary relief.

Undoubtedly fumigation with hydrocyanic-acid gas is one of the most effective methods of procedure, especially if rats can be excluded following the treatment. This was tried in a motion-picture house in May, 1922. Up to September 1 of that year there was no recurrence of the mite trouble, although the rats had reappeared in moderate numbers. In this case the standard proportions of the chemicals were employed, using 10 ounces of sodium cyanid (96-98 per cent) for each 1,000 cubic feet of contained space. As hydrocyanic-acid gas is extremely poisonous, fumigation should be conducted only by those who are thoroughly informed regarding the process and who use the greatest care.

Pyrethrum when fresh gives relief if used very frequently, but in all cases it seems essential to get at the nesting places of the rats to secure satisfactory control.

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